KENWOOD

144MHz FM TRANSCEIVER

TH-25A SERIES

430/440MHz FM TRANSCEIVER

TH-45A SERIES

1200MHz FM TRANSCEIVER

TH-55AT SERIES

INSTRUCTION MANUAL

KENWOOD CORPORATION

©PRINTED IN JAPAN B50-8170-50(K, M, T, X)(T)
90/12 11 10 9 8 7 6 5 4 3 2 1 89/12 11 10 9 8 7 6 5

Thank you for purchasing this new transceiver.

IMPORTANT:

Please read this instruction manual carefully before placing your transceiver in service.

SAVE THIS INSTRUCTION MANUAL.

This Instruction Manual covers the following models:

TH-25AT :144 MHz FM transceiver with DTMF Pad.
TH-25A :144 MHz FM transceiver without DTMF Pad.
TH-25E :144 MHz FM transceiver with Tone. (with Tone Burst for U.K. version)
TH-45AT :430/440 MHz FM transceiver with DTMF Pad.
TH-45A :430/440 MHz FM transceiver without DTMF Pad.
TH-45E :430 MHz FM transceiver with tone. (with Tone Burst for U.K. version)
TH-55AT :1200 MHz FM transceiver with DTMF Pad.
TH-55E :1200 MHz FM transceiver with Tone. (with Tone Burst for U.K. version)

Under normal circumstances, the transceiver will operate in accordance with these operating instructions. The transceiver has been adjusted at the factory and should only be readjusted by a qualified technician with proper test equipment.
Attempting service or alignment without factory authorization can void the transceiver's warranty.

CAUTION:

Long transmission or extended operation in the HI power mode might cause the rear of this transceiver to get warm. Do not place the transceiver where the heat sink (rear panel) might come in contact with plastic or vinyl surfaces. Use of an external antenna for fixed station is recommended.

Illustrations show the TH-25A.

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1. SPECIFICATIONS and ACCESSORIES

1-1 SPECIFICATIONS

■ GENERAL			TH-25A/25AT/25E 2 m Band	TH-45A/45AT/45E 70 cm Band	TH-55AT/55E 23 cm Band
FREQUENCY RANGE (MHz)	U.S.A. version		144.000~147.995	440.000~449.995	1258.000~1299.9875
	European and U.K. version		144.000~145.995	430.000~439.995	1258.000~1299.9875
	Others		144.000~147.995	430.000~439.995	1258.000~1299.9875
MODE			F3E (FM)		
MEMORY CHANNELS			14		
FREQUENCY STEP (kHz)			TH-25A/25AT: 5, 10 / TH-25E: 12.5, 5	TH-45A/45AT: 25, 5 / TH-45E: 12.5, 5	25, 12.5
ANTENNA IMPEDANCE (Ω)			50		
POWER REQUIREMENT			6~16 (7.2 VDC nominal)		
CURRENT DRAIN	HI	12 V (with PB-8 or DC-1)	Less than 1.2 A	Less than 1.8 A	Less than 1.0 A
		9 V (with BT-6)	Approx. 0.9 A	Approx. 1.4 A	Less than 1.0 A
		7.2 V (with PB-5/6/7/9)	Approx. 0.8 A	Approx. 1.1 A	Approx. 0.8 A
	LO transmit mode		Less than 0.4 A	Less than 0.6 A	Less than 0.6 A
	RECEIVE mode with no signal		Approx. 55 mA	Approx. 60 mA	Approx. 60 mA
	BATTERY SAVER mode		Approx. 16 mA	Approx. 17 mA	Approx. 17 mA
	AUTOMATIC POWER OFF mode		Approx. 6 mA		Approx. 5 mA
FREQUENCY STABILITY (−10°C ~ +60°C)					±3 ppm
GROUND			Negative		
DIMENSIONS (W×H×D)	Projections not included (mm)		58×137.5×29.5 (2.3×5.4×1.2 inch)		58×157.5×29.5
	Projections included (mm)	A/E	68.5×152.0×34.5 (2.7×6.0×1.35 inch)		68.5×172×37.5
		AT	68.5×152.0×35.5 (2.7×6.0×1.4 inch)		(2.7×7.0×1.5 inch)
WEIGHT (g)	With NiCd Battery and Antenna		400 (0.88 lbs.)		450 (0.99 lbs)
OPERATING TEMPERATURE			−20°C ~ +50°C (−4°F ~ 122°F)		
MICROPHONE IMPEDANCE			2 kΩ		
■ TRANSMITTER					
OUTPUT POWER	HI	12 V (with PB-8 or DC-1)	More than 5 W		1 W
		9 V (with BT-6)	Approx. 3.5 W	Approx. 3.5 W	1 W
		7.2 V (with PB-5/6/7/9)	Approx. 2.5 W	Approx. 2 W	Approx. 0.8 W

OUTPUT POWER	LO	Approx. 0.5 W		Approx. 0.1 W
MODULATION		REACTANCE		
MAXIMUM FREQUENCY DEVIATION (kHz)		±5		
SPURIOUS RADIATION		Less than −60 dB		Less than −50 dB
DUTY CYCLE OPERATION		1 minute transmission 3 minutes reception recommended		
■ RECEIVER				
CIRCUITRY		DOUBLE CONVERSION SUPERHETERODYNE		
INTERMEDIATE FREQUENCY	1st IF (MHz)	16.9	30.825	59.7
	2nd IF (kHz)	455		
SENSITIVITY	12 dB SINAD	Less than 0.16 μV	Less than 0.18 μV	Less than 0.25 μV
SQUELCH SENSITIVITY		Less than 0.1 μV		Less than 0.16 μV
SELECTIVITY	−6 dB	More than 12 kHz		
	−40 dB	Less than 28 kHz		Less than 32 kHz
RIT variable range				More than ±5 kHz
AUDIO OUTPUT POWER (across 8 Ω load 10% distortion)		More than 200 mW		

Note: Circuit and ratings are subject to change without notice, due to development in technology.

1-2 ACCESSORIES

Unpack your transceiver carefully and confirm that the accessories listed below are included in the box.

1 Antenna 1
  For 144 MHz T90-0356-05
  or For 430/440 MHz T90-0355-05
  or For 1200 MHz T90-0364-05
2 Belt Hook J29-0424-04 1
3 Rubber Cap B09-0309-04 1
4 Hand Strap J69-0312-04 1
5 Battery 1
  NiCd battery pack (PB-6) W09-0507-05
6 Battery Charger 1
  for U.S.A. version (120 V) ... W09-0382-XX
  for European version (220 V) .. W09-0388-XX
  for U.K. version (240 V) W09-0387-XX
  for Oceania version (240 V) .. W09-0386-XX
  for Other market (220 V) W09-0388-XX
  (120 V) W09-0385-XX
7 Label B42-3325-04 1
8 Warranty Card 1
9 Instruction Manual B50-8170-XX 1

After unpacking
Shipping container: Save the boxes and packing in the event your unit needs to be transported for remote operation, maintenance, or service.

2. BATTERY PACK

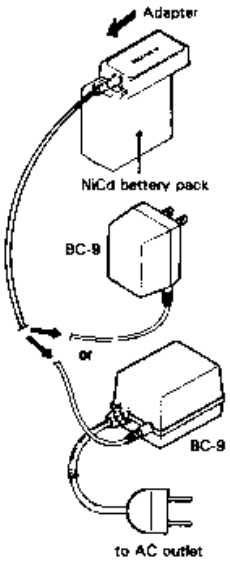
2-1 NiCd BATTERY PACK (PB-6)

This battery pack has not been charged at the factory in order to provide you with the greatest number of charge/discharge cycles. You must charge the battery before use. The battery pack will require several charge/discharge cycles before you can expect to see the maximum operating period between charges. If the battery will be stored for greater than 2 months it should be recharged before use.

2-2 RECHARGING

1. Slide the adapter onto the NiCd battery pack.
2. Plug the supplied charger into an AC outlet.
3. **Do not allow the battery to charge for greater than 15 hours.**
   The useful life and battery performance will be reduced if you exceed the recommended charge period.

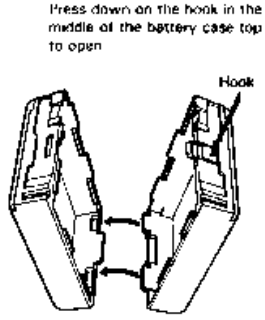
Note:
Recharging should be performed within an ambient temperature range of between 5°C ~ 40°C (41°F – 104°F).
Recharging the battery outside of this range may not allow the battery to reach full charge.



2-3 MANGANESE or ALKALINE BATTERIES (Optional Battery Case BT-6)

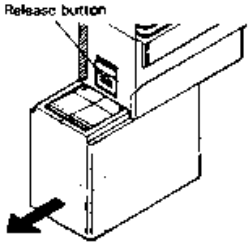
Install 6 x R6 (AA) manganese or alkaline batteries in the battery holder. Pay close attention the battery polarities marked in the holder. We recommend the use of high performance manganese batteries for the greatest operating time.

Note:
Do not install NiCd batteries and attempt to charge them with the supplied charger. There is no battery protection circuit in the battery holder.



2-4 INSTALLING THE BATTERY PACK

Align the grooves in the battery pack with the transceiver and slide the pack to the right until it locks in place.
To remove the battery pack push up on the release button and slide the pack to the left.



2-5 BATTERY VOLTAGE LEVEL METER

The S meter indicates the relative battery voltage during transmit.
Recharge/replace the batteries when the level reaches the low indicator.

NiCd Battery pack

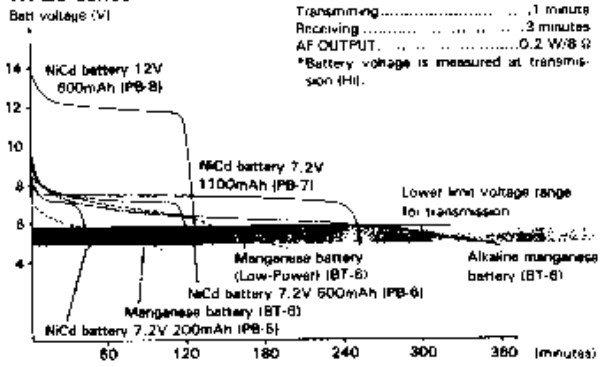
MODEL	V	mAh	Fully charged	Fully discharged
PB-5	7.2	200	or	
PB-6		600		
PB-9				
PB-7		1100		
PB-8	12	600		

Manganese or Alkaline batteries (Approximate battery condition)

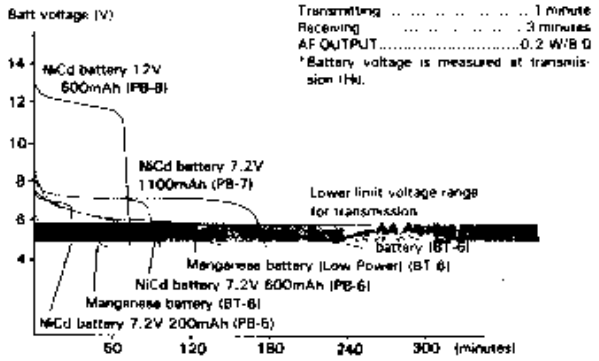
	New batteries	Need to replace
BT-6, 9 V		

2-6 OPERATING TIME

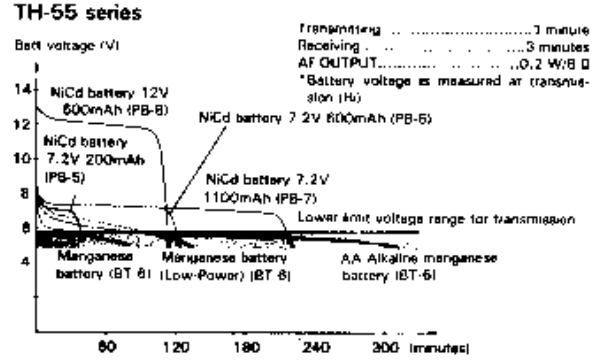
TH-25 series



TH-45 series



TH-55 series



We recommend use of the NiCd battery pack for long transmission or extended operation.
Manganese battery (except Alkaline manganese battery) is suitable only for LOW power transmission.

3. OPERATION

3-1 OPERATING CONTROLS

① Antenna connector

Connect the antenna that is supplied to this jack. Twist to lock.

② TX indicator

ON whenever the transceiver is in the transmit mode.

③ Volume control/Power switch

The volume control and power switch are combined. Rotating the control clockwise will turn ON the transceiver. Advancing the control further clockwise will increase the volume.

④ SQL control

This control is used to select the desired Squelch threshold level.

⑤ MHz key

This key is used to select the tuning rate of the Tuning control. When the MHz indicator is lit, the Tuning control will cause the transceiver to increase or decrease in 1 MHz step.

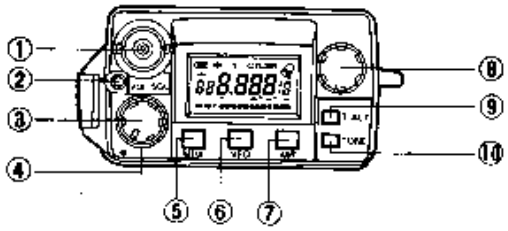
⑥ VFO key

This key is used to switch back to VFO operation after operating in the MR (Memory Recall) mode. The tuning control will increase or decrease frequency in accordance with the VFO indicator. See the chart below for your transceiver.

(kHz)

	TH-25A/25AT	TH-25E/45E	TH-45A/45AT	TH-55AT/55E
STEP SIZE	5/10	12.5/5	25/5	25/12.5

Pressing this key for longer than 1 second will initiate the Band Scan function.



⑦ MR key

This key is used to switch from the VFO mode to the MR (Memory Recall) mode. The tuning control may be used to select the desired memory channel in this mode.
Pressing this key for longer than 1 second will initiate the Memory Scan function.

⑧ Tuning control

Rotate this control clockwise to increase frequency and counterclockwise to decrease the transmit/receive frequency.
This control is also used to select the desired memory channel and the scan direction.

⑨ Tone Alert key

This key is used to activate the Tone Alert function.

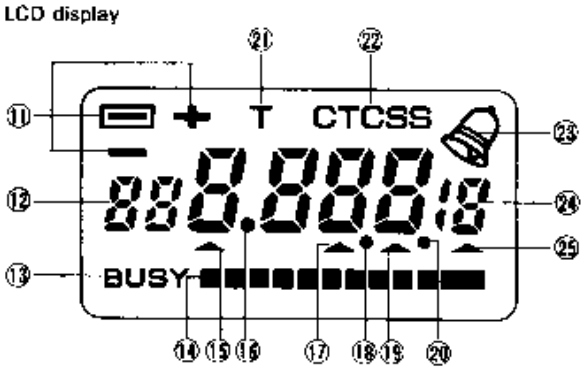
⑩ Tone key

U.S. version: This key is used to activate the subaudible tone encoder.

European version: This key is used to transmit a Tone signal. When the key is depressed the repeater control signal of 1750 Hz is activated.

U.K. version: This key is used to activate the 1750 Hz tone burst.

LCD display



⑪ ▭ + (European version: ▭ −)

Displays the selected transmitter offset direction. When neither indicator is ON the transceiver is in the Simplex mode. When both indicators are ON the transceiver is in the Split Channel mode.
When a indicator flashes the transceiver is in the Reverse function.

⑫ Frequency display

Displays the operating frequency to the nearest kHz.
TH-55AT/55E: Displays the operating frequency from 10 MHz digit.

⑬ Busy indicator

ON whenever there is a signal present strong enough to open the squelch, or when the squelch is not activated, and the CTCSS key is OFF.

⑭ ▬▬▬▬▬

Used to indicate the relative receive signal strength, or as an indication of the battery voltage level during transmit.

⑮ MHz indicator

This indicator flashes during MHz tuning steps.

⑯ MHz dot

This indicator flashes during scan operations.

⑰ VFO indicator

This indicator lights during VFO operation.

⑱ Hz dot

This indicator lights during CTCSS frequency selection, and is used to show the 1 Hz digit.
Additionally ON when the Battery Saver and Automatic Power Off function have been cancelled.

⑲ 5 kHz tuning step indicator

This indicator lights during VFO operation when tuning in 5 kHz steps.

⑳ 500 Hz dot (TH-25E/TH-45E only)

This indicator show 500 Hz.

㉑ T indicator

This indicator is ON when the Tone function is active.

㉒ CTCSS indicator

This indicator is ON when the CTCSS function is active.

㉓ T. ALT indicator

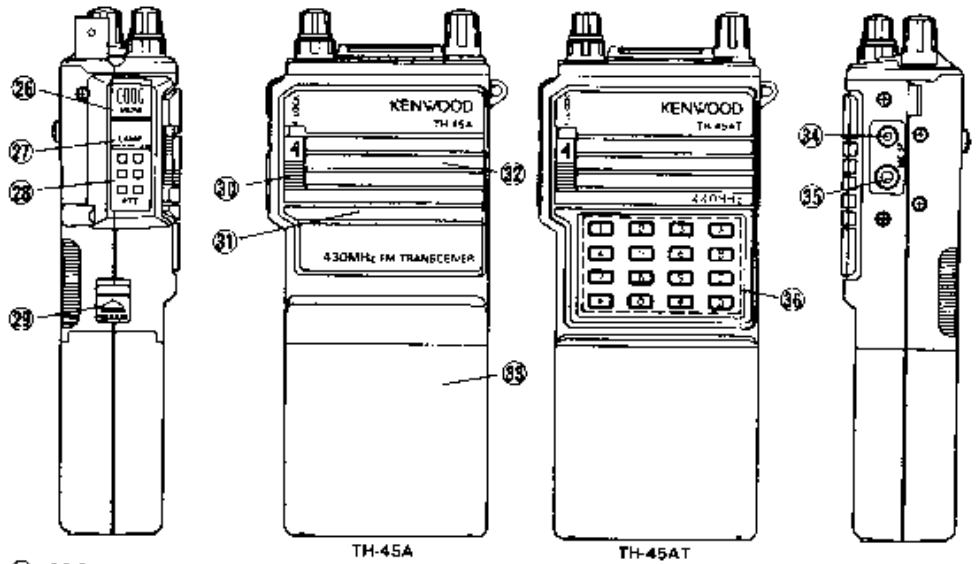
This indicator is ON when the Tone alert system is active. The indicator will flash when a signal is received.

㉔ Memory channel indicator

This indicator is used to show the selected memory channel number

㉕ Memory indicator

This indicator lights during Memory Recall mode, and flashes during Memory entry.



TH-45A TH-45AT

㉖ MONITOR switch

When operating in the CTCSS (Tone Squelch) mode you can use this key to determine if the frequency is in use before transmitting. Pressing this key will disable the CTCSS function as long as the key is held depressed.

㉗ Lamp switch

This switch is used to control the night lamp on the LCD display. The lamp will turn itself OFF automatically 5 seconds after the last key operation.

㉘ PTT (Push To Talk) switch

Press this switch whenever you wish to transmit.

㉙ Release button

Press this button up to release the battery pack.

㉚ F. Lock key

This key will deactivate all functions except the Lamp, MONI, PTT functions.

㉛ Speaker

㉜ Microphone

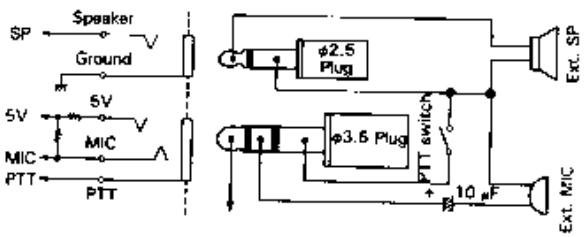
㉝ Battery case

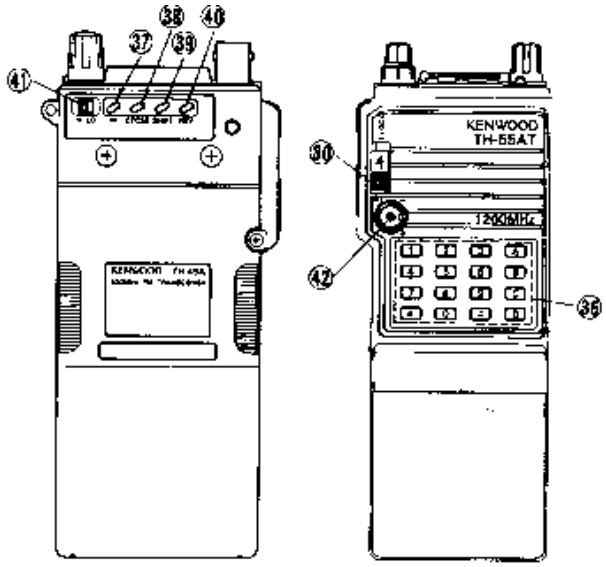
㉞ SP jack

This jack is used to connect an external speaker or earphone. The recommended impedance is 8 Ω.

㉟ MIC jack

This jack is used for connection of an external microphone. The use of an electret type microphone is recommended.
Input impedance is 2 kΩ and the DC voltage on this terminal is Approx. 4 V (MAX 3.5 mA).
Note:
The use of a dynamic microphone is not recommended.





㊱ DTMF PAD (with the TH-25AT/45AT/55AT)

This key pad is used in conjunction with a repeater to provide AUTOPATCH capabilities

㊲ M (Memory) key

This key is used to enter a frequency, offset, etc. into the desired Memory channel.
When this key is pressed during Memory channel operation the contents of the Memory channel are duplicated in the VFO, and the transceiver returnes to VFO operation.
The contents of the memory are not lost during this procedure.

㊳ CTCSS key

This key is used to select the CTCSS (Tone squelch) function.

㊴ SHIFT key

This key is used to select the desired transmitter offset for repeater operation. When the offset function is ON, + or ▭ will be displayed in the display.

㊵ REV key

Pressing the REV key allows you to reverse the transmit/receive frequencies during repeater operations. This will allow you to check the input of the repeater or to operate on a reverse repeater pair.

㊶ HI-LO switch

This switch is used to select the transmit output power.

TH-25A/45A SERIES **TH-55AT SERIES**

㊷ RIT control (TH-55AT/55E only)

When the transmit frequency of the distant station drifts a little bit during the QSO, but you do not wish to alter your transmit frequency to compensate, you may wish to make use of the RIT control function. This control allows shifting the receive frequency approximately ±5 kHz without shifting the transmit frequency.

3-2 RECEIVER OPERATION

Connect the battery pack, and the supplied antenna.
Set the controls as follows:

1. Rotate the POWER (VOL) control clockwise to turn the transceiver ON. A frequency will appear in the display.
2. As the VOL control is rotated clockwise either background noise or a QSO will be heard coming from the speaker, provided the CTCSS and Squelch are not ON.
3. To eliminate the no signal noise turn the SQL control clockwise to the point the background noise just disappears. This point is known as the Squelch Threshold point.
4. Select the desired operating frequency using the tuning control.

Frequency Selection

Press the VFO key. An operating frequency will appear in the display.

● VFO Mode

1. Press the VFO key.
2. Turn the tuning control to increase/decrease the frequency. The step size is determined by the location of the VFO indicators (See Step Size Selection below).

● MHz Mode

1. Press the MHz key. The MHz indicator will begin flashing.
2. The tuning control will now increase/decrease the operating frequency in 1 MHz increments.
3. The tuning step will revert to the VFO mode 5 seconds after you stop turning the tuning control.

Step Size Selection

1. Press the VFO key.
2. Press the M key.
3. Within 5 seconds of pressing the M key press the MHz key. The VFO indicator will toggle between 5 kHz and 10 kHz (See the chart below for your transceiver.) each time this sequence is performed.

(kHz)

	TH-25A/25AT	TH-25E/45E	TH-45A/45AT	TH-55AT/55E
STEP SIZE	5/10	12.5/5	25/5	25/12.5

Note:
If you are already in the VFO mode you can skip step number 1.

3-3 TRANSMITTER OPERATION

CAUTION: –

Ensure that an antenna with a low standing wave ratio (SWR) is attached to the antenna connector before attempting to transmit. Failure to provide proper termination may result in damage to the final amplifier section.
Always check to ensure the frequency is clear before transmitting.

1. Select the desired operating frequency using any of the methods described above.
2. Check the frequency to see if it is occupied before you transmit. If you are using CTCSS (Tone Squelch) press the MONITOR key to allow the Squelch to open.
3. Press the PTT switch. The TX indicator will light.
4. Speak into the microphone. The recommended distance to the microphone is 5 cm (2 inches). Talking closer may result in overdeviation of your transmit signal, and talking too far away may result in reports of weak audio.
5. Release the PTT switch to return to the receive mode. The TX indicator should go out.

3-4 MEMORY

The transceiver provides 14 memory channels. In addition to serving as a normal memory channel some of the memory channels serve a dual purpose to specify other parameters.

* Memory channel 13 and 14 are used to store both a transmit and a receive frequency for ODD SPLIT operations.

● **Memory channel contents**

Each memory channel is capable of storing;

* Frequency
* CTCSS status
* Tone status (Excluding European Versions)
* Tone frequency
* SHIFT status

3-4-1 AUTOMATIC MEMORY INITIALIZATION

CAUTION:

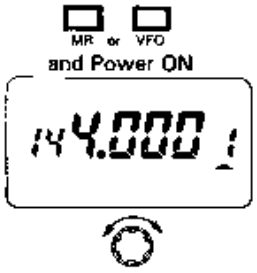
This procedure will erase all of the current data in memory channels 1 thru 10.

This transceiver can automatically store data in memory channels 1 thru 10 in the following steps.

	TH-25A/25AT	TH-25E	TH-45A/45AT/45E/55AT/55E
MR key	15 kHz	12.5 kHz	25 kHz
VFO key	20 kHz	25 kHz	

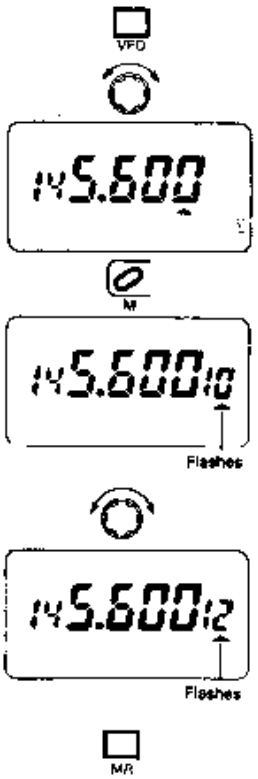
This automatic storage will begin from the frequency that appeared in the display before the transceiver was turned OFF.

1. Press and hold either the MR or the VFO key and turn ON the power.
2. Release the MR or the VFO key. The memory channel 1 indicator will be on.
3. Rotate the tuning control to confirm data entry in the remaining channels (2 thru 10).



3-4-2 MEMORY ENTRY

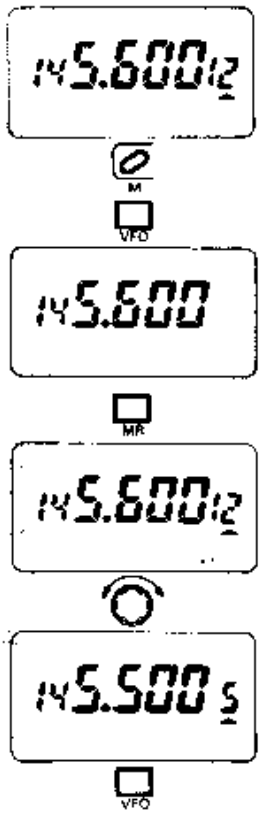
1. Select the desired operating frequency, offset, tone frequency, etc. (For example 145.600 MHz)
2. Press the M key to select the Memory Entry Mode.
3. Within 5 seconds of pressing the M key rotate the tuning control until the desired memory channel number appears in the display. (For example Ch. 12)
4. Press the MR key within 5 seconds of selecting the Memory channel number. If you do not press the MR key within 5 seconds data will not be stored into memory.



3-4-3 MEMORY SHIFT

It is possible to copy the contents of a memory channel to the VFO without erasing the memory channel.

1. Select the desired Memory Channel. (For example Ch. 12)
2. Press the M key
3. Within 5 seconds press the VFO key to copy the data.



3-4-4 MEMORY RECALL

1. Press the MR key. The memory channel that was active before return to the VFO mode will appear in the display. (For example Ch. 12)
2. Rotate the tuning control until the desired Memory channel number appears in the display. (For example Ch. 5)

   Note:

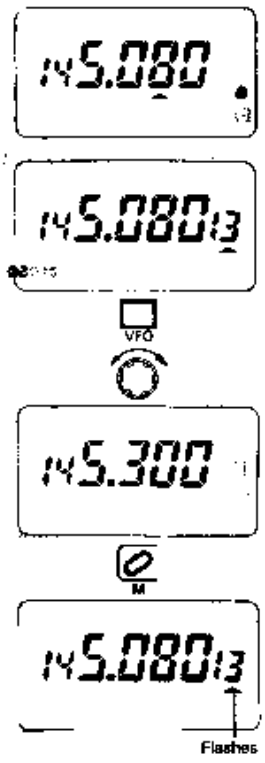
   If a channel contains no data it cannot be displayed using this procedure.
3. To return to the VFO mode, press the VFO key.

3-4-5 ODD SPLIT

Memory channels 13 and 14 store both a transmit and a receive frequency. These channels allow operation on "Odd Split" repeater channels.

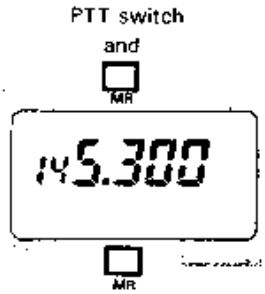
● **Data entry**

1. Select the desired receiver frequency, tone frequency, and tone status. (For example 145.080 MHz)
2. Enter the data into either memory channel 13 or 14 as described previously. (For example Ch. 13)
3. Select the desired transmitter frequency by pressing the VFO key and then rotating the tuning control. (For example 145.300 MHz)
4. Press the M key. Memory channel 13 will appear in the display.

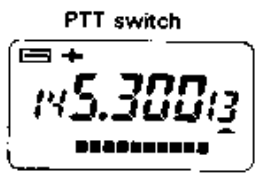


5. Press and hold the PTT key.

6. Press the MR key and then release both keys.



Note:
The PTT switch will not initiate transmit during this operation. The ▭ and + indicators will be on to indicate that this memory channel now contains odd split frequency data.

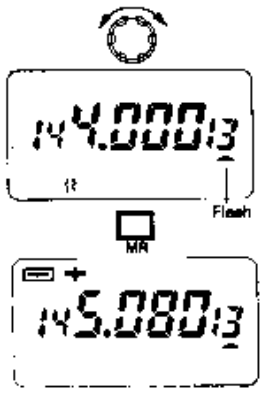


● **Release**
To cancel this Odd Split data simply store a new frequency into the memory channel using the normal memory channel method.

Note:
- Only the receiver frequency will be transferred to the VFO during a Memory Shift operation.
- TH-45A/45AT/55AT: During Odd Split operation the SHIFT key does not work.

3. Select the desired channel number using the tuning control. You will be able to see all channel numbers with this procedure. (For example Ch. 13)

4. Press the MR key within 5 seconds. The Memory channel number will appear in the display.



3-4-7 CLEARING ALL MEMORY (Microprocessor initialization)

To erase the data from all memory channels at the same time you can reset the microprocessor. This will remove any programmed information that you have entered.

1. Turn the Power switch OFF.
2. Press and hold the M key.
3. Turn ON the power switch and then release the M key.
4. The display will show: 144.000 (TH-25A/25AT/25E)
   430.000 (TH-45A/45E)
   440.000 (TH-45AT)
   60.000 (TH-55AT/55E)

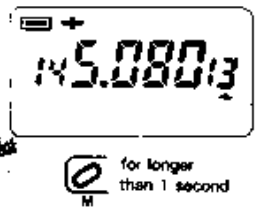
3-4-8 MEMORY BACK-UP BATTERY

A lithium battery is contained in the transceiver to retain memory. Turning off the power switch, changing or fully discharging the normal battery will not erase the memory. The battery should last for approx. 5 years. When the battery discharges, an erroneous display may appear in the display. (For the lithium battery replacement, refer to IN CASE OF DIFFICULTY, Page 23)

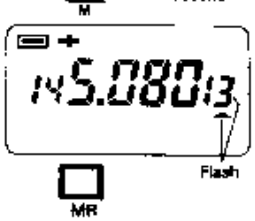
3-4-6 MEMORY CHANNEL LOCKOUT

The Memory Channel Lockout function allows you to temporarily skip unwanted Memory Channels except Channel 1.

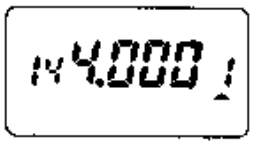
1. Press the MR key and select the memory channel you wish to skip. (For example Ch. 13)



2. Press the M key for longer than 1 second. Both the channel number and the Memory indicator (▲) will flash.



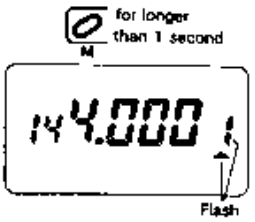
3. Press the MR key within 5 seconds. The selected memory channel number will disappear and the channel number of the next active memory channel will appear. (For example Ch. 1)



● **Release**

1. Press the MR key to select the MR mode.

2. Press the M key for longer than 1 second. Both the channel number and the Memory indicator (▲) will flash.



3-5 SCAN

For proper scan operation the squelch must be adjusted to the threshold point.
The MHz dot will flash ON and OFF as a visual indication that the transceiver is scanning.

● **Scan Modes**

Band Scan: Scans the entire band.
Pressing the VFO key for longer than 1 second will initiate Scan. The scan step size depends upon the current step programming.

Memory Channel Scan: Scans those memories that actually have data and have not been locked out.
Pressing the MR key for longer than 1 second will initiate Scan.

● **Scan Hold**

Scan will stop on a busy channel and hold for approximately 5 seconds. Scan will resume even if the station is still present. You can manually cause scan to resume by rotating the Tuning control.

● **Scan Direction**

Scan will begin in an upwards direction. You can reverse the direction by rotating the Tuning control counter-clockwise.

● **Scan Release**

Scan can be released by pressing PTT switch (no transmitting) or any key except the LAMP, or MONI key.

3-6 REPEATER OPERATION

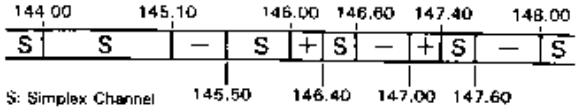
3-6-1 TRANSMITTER OFFSETS

All amateur radio repeaters utilize a separate receiver and transmitter section. The receiver frequency may be either above or below the transmitter frequency.
For most repeaters offsets are as follows:

Model / Display	TH-25A TH-25AT TH-25E	TH-45A TH-45AT	TH-45E		TH-55AT	TH-55E
			European version	U.K. version		
+	+600kHz	+5MHz		+1.6MHz	+12MHz	+36MHz
−	−600kHz	−5MHz	−1.6MHz	−1.6MHz	−12MHz	−8MHz
			−7.6MHz			

● **Offset Direction**
To select the desired transmitter offset direction press the SHIFT key. Each time you press the key the transceiver will advance from one offset to the other, i.e. + to − (− to | with TH-45E European version) to no offset (simplex).
The transceiver allows you to store the frequency, offset in memory, or you can select these functions directly from the keyboard.

● **Auto-Offset (TH-25AT only)**
The TH-25AT has been programmed according to the standard ARRL Band Plan, regarding transmitter offsets. Please see the accompanying chart for additional information. You can, of course, override this by using the SHIFT function, if desired.



3-6-2 REVERSE FUNCTION

Some repeaters utilize a "Reverse pair", i.e. the transmit/receive frequencies are exactly the reverse of another repeater. For example repeater A uses 146.000 for a transmit frequency (OUTPUT) and 146.600 for receive (INPUT). Repeater B uses 146.000 for its receive and 146.600 for its transmit frequency. It would be inconvenient to have to reprogram the transceiver each time if you were in range of both repeaters.
The REV key allows you to reverse the transmit and receive frequencies. To use the REVERSE function press the REV key. The offsat indicator (+ or − / − or |) will flash OFF and ON in the display to remind you that you are working a reverse repeater pair.
To return to normal offsets press the REV key again. This function is also useful to check the input frequency of the repeater, so that you can determine if you are within SIMPLEX communications range.

3-6-3 TONE OPERATION

Some repeaters require the use of a control signal to activate the repeater. Several versions are currently in use worldwise.
In the United States sub-audible tones are sometimes used. With the TH-25A/25AT/45A/45AT/55AT 37 different sub-audible tone frequency selections are possible with the use of the optional sub-audible tone encoder/decoder (TSU-6). This accessory also allows for CTCSS (Tone Squelch) operations. When this option is activated the squelch of the transceiver will only open when the proper sub audible tone is received.

● **Tone Activation**
To activate the TONE function depress the TONE switch on the top of the transceiver. The tone indicator will appear in the display to signify the tone has been activated. To turn the tone OFF press the TONE key again.

Tone frequency selection

1. Press the CTCSS key for longer than 1 second. The current tone frequency will be displayed.
2. Rotate the Tuning control until the desired tone frequency appears in the display.
3. Press the TONE key to turn to the normal frequency display.
4. If CTCSS (Tone Squelch) is not desired press the CTCSS key to cancel the function. The transmit tone will still be active.

Tone Frequency

67.0 Hz	110.9 Hz	173.8 Hz
71.9 Hz	114.8 Hz	179.9 Hz
74.4 Hz	118.8 Hz	186.2 Hz
77.0 Hz	123.0 Hz	192.8 Hz
79.7 Hz	127.3 Hz	203.5 Hz
82.5 Hz	131.8 Hz	210.7 Hz
85.4 Hz	136.5 Hz	218.1 Hz
88.5 Hz	141.3 Hz	225.7 Hz
91.5 Hz	146.2 Hz	233.6 Hz
94.8 Hz	151.4 Hz	241.8 Hz
100.0 Hz	156.7 Hz	250.3 Hz
103.5 Hz	162.2 Hz	
107.2 Hz	167.9 Hz	

Note:
When no Tone Unit is installed, pressing the TONE key will not transmit a subtone, even if the indicator is ON.

In Europe a 1750 Hz tone is used in transmit. Press and hold the TONE key to transmit the access tone, then press the PTT switch.
In the United Kingdom a 1750 Hz tone burst at the beginning of each transmission is used. Press the Tone key.
Since use of this tone is required in the Europe and the United Kingdom, an 1750 Hz tone encoder is encluded as standard equipment.

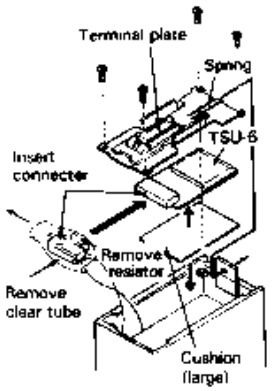
● **CTCSS (Tone Squelch) Operation**

1. To actuate the CTCSS (tone squelch) function (decode) select the desired tone frequency as described above but do not press the CTCSS key the second time.
2. Squelch will now open only when the transceiver receives the same subtone frequency.
3. To release tone squelch operation press the CTCSS key. The CTCSS indicator should go out.

It is a good operating practice to check the frequency before transmitting. A MONITOR switch has been provided for this purpose when using the CTCSS (tone squelch) function. Pressing this switch will open the squelch so you can check for activity.

● **TSU-6 (option) Installation**

1. Remove the backing from the cushion (large) that was provided the TSU-6 and attach it to the back of the TSU-6.
2. Remove the Battery Pack and remove the four phillips head screws from the terminal plate of the transceiver.
3. Turn the terminal plate over and take out the cable as shown in the diagram.
4. Remove the clear tube covering the connector, and the resistor inserted into the connector.



5. Attach the cable from TSU-6 as shown in the diagram.
6. Remove the backing from the other side of the cushion and attach the TSU-6 to the transceiver.

7. Push up on the release button and set the terminal plate in the hole of the release button. Replace the terminal plate and tighten the screws to complete the installation. Do not pinch the wiring when closing the terminal plate.

3-6-4 AUTOPATCH
(TH-25AT/45AT/55AT U.S.A. version only)

Some repeaters offer a service known as autopatch. This allows you to dial a telephone number from your transceiver and carry out a telephone conversation, much like a car telephone, or cellular telephone. This function requires the use of a DTMF (Dual Tone Multi Frequency) pad. In addition to the normal 12 keys that are found on your telephone the transceiver also provides 4 additional keys, A, B, C, and D. These keys are required by some repeater systems for various control functions. You should check with the control operator of your repeater to determine if their use is required. A chart is provided that lists the tones that are generated when you press each key.

1. To activate the DTMF pad, press and hold the PTT switch.
2. Now press the keys just as you would dial a telephone.

Note:
Some repeaters will require a special sequence of keys to activate the Autopatch. Again you should check with the control operator of your repeater for this sequence.

Audio tones (Hz)

Row \ Column	1209	1336	1477	1633
697	1	2	3	A
770	4	5	6	B
852	7	8	9	C
941	*	0	#	D

3-7 BEEP TONE

If you would like audio confirmation when a function is activated press the M and then the T.ALT key. The transceiver will then supply audio confirmation according to the chart below. Pressing the same combination again will turn the function OFF.

Scale	Frequency (Hz)	Key operation
A	440.00	CALL, REV, T.ALT, TONE, CTCSS, MHz, M, SCAN OFF
B	493.88	SCAN STOP
C	523.25	VFO MODE SELECTION, MEMORY SHIFT
C#	554.37	– OFFSET
D	587.33	SIMPLEX
D#	622.26	+ OFFSET
E	659.25	MR MODE SELECTION
F	698.46	To complete the MEMORY Entry To complete the CTCSS Frequency selection
G	783.98	CALL, REV, T.ALT, TONE, CTCSS, MHz, M, SCAN ON
G#	830.61	MEMORY CHANNEL selection CTCSS Frequency selection
A	880.00	M, ODD SPLIT
A#	932.33	STEP SIZE selection
B	987.77	AUTOMATIC POWER OFF
F	1396.91	Key operation without effect
.	2000	T.ALT alarm

3-8 TONE ALERT SYSTEM

The Tone Alert function will provide an audible "alarm" to signal when someone is transmitting on the frequency you are monitoring.

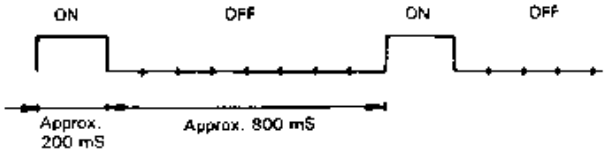
1. Adjust the SQL control to the threshold point.
2. If you will be using the TSU-6 for CTCSS decode you should select the desired tone frequency and then press the CTCSS key. Please refer to page 18.
3. Press the T.ALT key. The T.ALT indicator will light.
4. When a signal is present:
   The T.ALT indicator will flash.
   The busy indicator will light.
   The transceiver will beep ON and OFF for about 5 seconds.

   Note:
   When using CTCSS the incoming signal must be present for approximately 2 seconds in order for the T.ALT to function properly.
5. The T.ALT function can be released by pressing the T.ALT key again, or by pressing the PTT switch while the T.ALT indicator is flashing.

Note:
- The tuning control, PTT switch, and all the keys except MONI, LAMP are not effective during the T.ALT operations.
- During Tone Alert operation the AUTOMATIC POWER OFF function is disabled.

3-9 BATTERY SAVER

The transceiver provides a battery saver mode to conserve on battery power.
The transceiver will activate the battery saver circuit 10 seconds after the last key operation with the squelch closed.



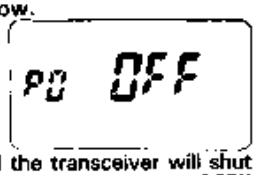
The function will be released by key operation or when squelch opens.
The function cannot operate during scan or tone frequency selection.

Note:
It is possible that you might press the MONI switch during the OFF period. Squelch would not open during this period.

3-10 AUTOMATIC POWER OFF

The transceiver also provides an Automatic Power OFF circuit.
The circuit action is described below.

1. A 5 second audio confirmation alert will sound after 59 minutes if no signal has been received and if you have not performed any key operation.



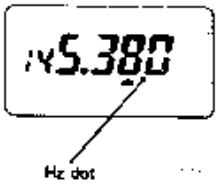
2. 1 minute after this alert signal the transceiver will shut itself OFF except for enough power to show "po OFF" in the LCD display.

Release
The function can be released by pressing the MONI key or turning the Power switch OFF and back ON.
The function can not be activated during scan or Tone Alert System operation.

Note:
To conserve battery life even more simply turn the transceiver OFF when you are not using it.

3-11 BATTERY SAVER and AUTOMATIC POWER OFF function CANCEL

The Battery Saver and Automatic Power Off functions can be turned Off or On simultaneously or you may turn off the Automatic Power Off function alone. The accompanying chart provides the procedures for both.

	Battery Saver and Automatic Power OFF	Automatic Power OFF
1.	Turn the Power Switch OFF.	
2.	Press and hold the MHz Key.	Press and hold the CTCSS key.
3.	Turn on the Power Switch.	
4.	Release the MHz Key.	Release the CTCSS key.
5.	The Hz dot will light as a visual remender that the function has been cancelled.	

Turning off the Power switch will not erase the status you have just set. The functions can be restored by this procedure.

Note:
These functions cannot be activated during T.ALT system operation or when F.LOCK key is on.

5. MAINTENANCE

GENERAL INFORMATION

Your transceiver has been factory aligned and tested to specification before shipment. Under normal circumstances the transceiver will operate in accordance with these operating instructions. All adjustable trimmers and coils in your transceiver has been adjusted at the factory and should only be readjusted by a qualified technician with proper test equipment. Attempting service or alignment without factory authorization can void the transceiver's warranty.

When operated properly, the transceiver will provide many years of service without requiring realignment. The information in this section gives some general service procedures which can be accomplished without sophisticated test equipment.

SERVICE

Should it ever become necessary to return the equipment to your dealer or service center for repair, pack it in its original box and packing, and include a full description of the problems involved. Also include your telephone number. You need not return accessory items unless directly related to the service problem.

Service note:

Dear OM, if you desire to correspond on a technical or operational problem, please make your note short, complete, and to the point, and PLEASE make it readable.

Please list: Model and serial number.
The problem you are having.

Please give sufficient detail to diagnose. Information such as other equipment in the station, meter readings and anything else you feel might be useful in attempting diagnosis.

Caution:
Do not pack the equipment in crushed newspapers for shipment. Extensive damage may result during shipment.

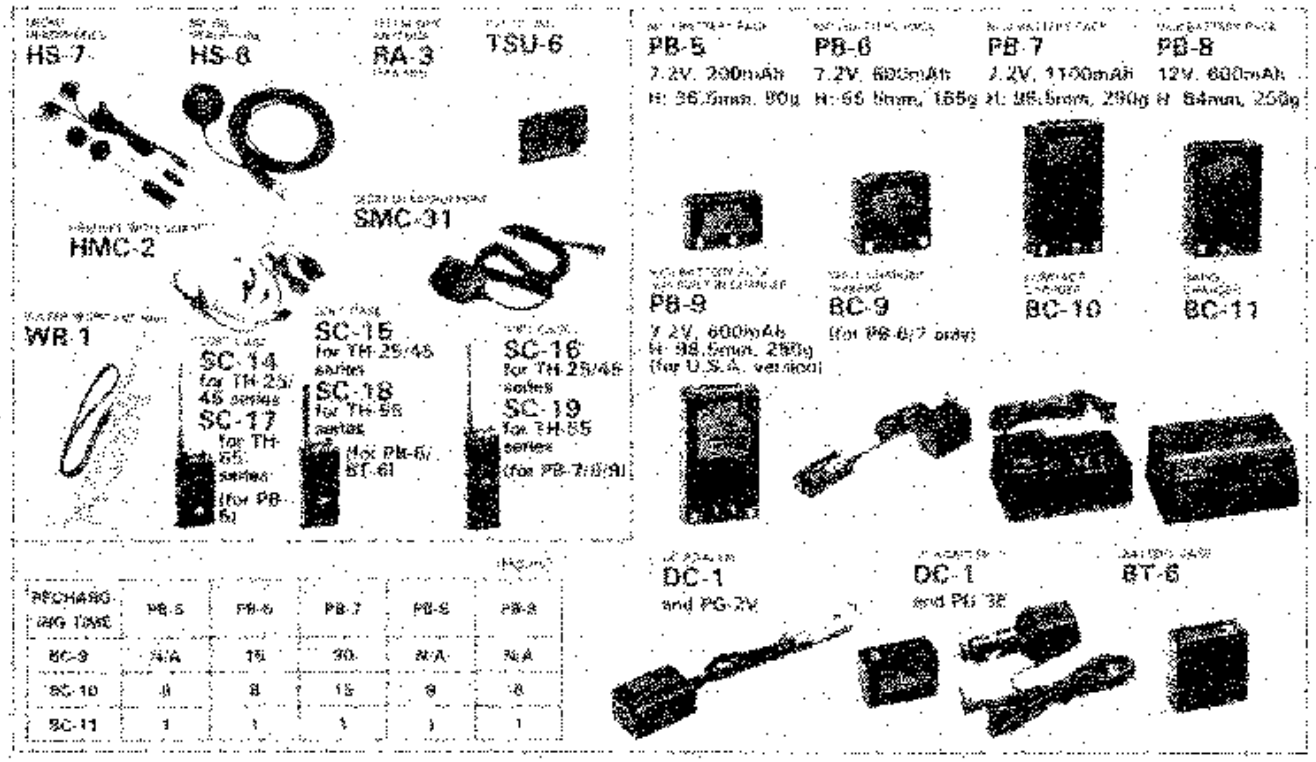
Notes:
1. Record the date of purchase, serial number and dealer from whom purchased.
2. For your own information, retain a written record of any maintenance performed on the unit.
3. When claiming warranty service, please include a photocopy of the bill of sale, or other proof of purchase showing the date of sale must accompany the transceiver.

IN CASE OF DIFFICULTY

The problems described in this table are failures caused in general by improper operation or connection of the transceiver, not by defective components. Examine and check according to the following table.

Symptom	Probable cause	Action
Indicators do not light and data is not displayed when power switch is pressed.	a. Low voltage With optional DC cable b. Wrong power polarity. c. Fuse is blown.	a. Recharge/replace the battery. b. Connect red to "+" and black to "−". c. Replace with the specified fuse.
All the indicators go out on the LCD display, or TX indicator does not light. All the indicators flash.	a. Low voltage	a. Recharge/replace the battery.
No sound from the speaker. No signal can be received.	a. Squelch is closed. b. PTT switch is depressed setting the unit in the transmit mode.	a. Turn the SQL control counterclockwise. b. Release the PTT switch.
No control works.	a. LOCK is ON. b. T.ALT key is ON.	a. Place the F.LOCK switch to OFF position. b. Press the T.ALT key.
When rotating the Tuning control after the M key has been pressed, no control works.	a. Nothing is stored in the memory channel.	a. See page 13: MEMORY ENTRY
Memory cannot be backed up.	a. Backup battery voltage is low.	a. Contact the authorized dealer.
(TH-55AT/55E only) The receive tone may become distorted, making it difficult to hear.	a. The transmit frequency of the distant station drifts a little. b. The RIT control is adjusted off the detent position.	a. Adjust the RIT control as required. b. Set the RIT control to the detent (click) position.
(TH-55AT/55E only) No autopatch tone is transmitted even though the PTT switch is depressed and a tone sounds through the speaker.	a. The transmit indicator is not on, even though the PTT switch is depressed. For example: When programming Odd Split data.	a. Ensure the TX indicator is ON.

6. OPTIONAL ACCESSORIES



RECHARGING TIME	PB-5	PB-6	PB-7	PB-8	PB-9
BC-9	N/A	15	30	N/A	N/A
BC-10	8	8	15	8	8
BC-11	1	1	1	1	1

NOTE: Some optional accessories may not be available in your area.